Gas Journal

VOL. 295. 110th YEAR. LONDON, JULY 9, 1958. No 4956. PRICE 1/6

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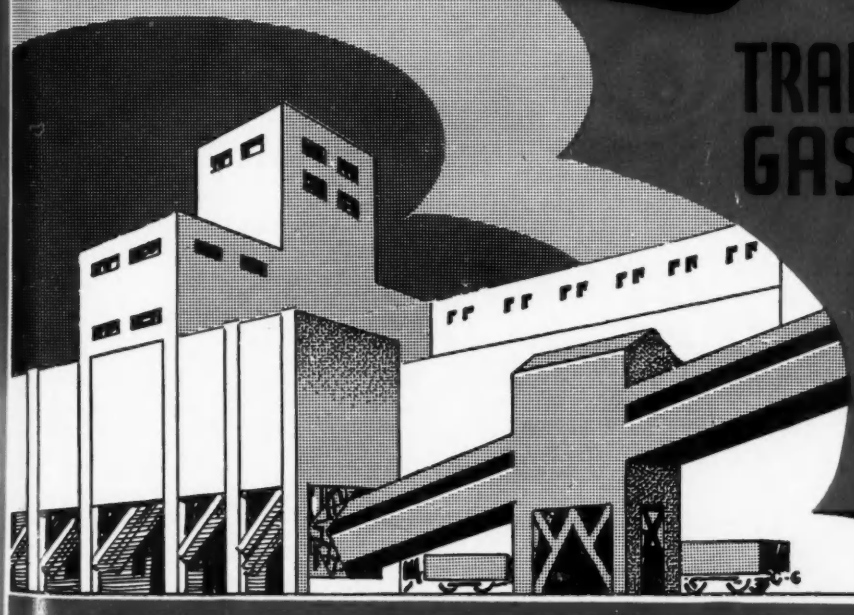

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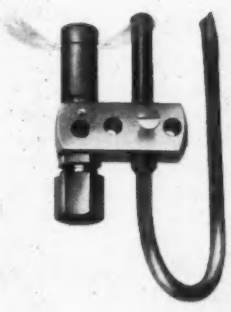

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Gas Journal

VOL. 295 NO. 4956 9 JULY, 1958

110TH YEAR

MANAGING DIRECTOR: Clifford A. King

EDITOR: Geoffrey W. Battison

ASSISTANT EDITOR: Colin J. Godbold

TECHNICAL EDITOR: Charles J. P. de Winton, T.D., M.A., M.Inst. Gas E., M. Inst. F.

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There is more in gas metering than meets the eye

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Gas Journal

VOLUME 295. No. 4956 JULY 9, 1958. 110th YEAR

The Importance of Degree Days

THE rate of production of any commodity by industry naturally depends on its demand by the general public or by other industries. By the judicious use of stocking facilities it is generally possible to calculate a steady output throughout the year when the demand is seasonable and to stock the surplus production at times of low demand for sale at a later date when from experience the demand is known to increase.

This is applicable to the fuel industries as to any other industry, and if the fuel is liquid or solid, storage is a reasonably simple matter. When the fuel is gaseous, the problem of meeting peak loads has to be solved. Even with solid and liquid fuels a knowledge of probable demand at the coldest season of the year is extremely useful to the merchant or distributor who can both adjust his local stocks accordingly and have a very fair idea of when his customers' premises are likely to need replenishing. In this way he can organise both his stocks and his deliveries to run his business as economically as possible.

Since the seasonable demand for fuel is almost entirely for the heating of buildings and not for the production of power or for heat process work, both of which remain reasonably constant throughout the year, a knowledge of the effect of the outside temperature on the temperature inside a building is necessary. When the temperature inside a building has settled down, the heat applied by the space heating system must equal that being lost to its surroundings. This is proportional to the difference in temperature between the interior of the building and the atmosphere outside, which varies according to the season. In order to put this on a scientific basis the idea of the 'degree-day' was introduced.

The aim of the degree day is to enable fuel requirements to be forecast for maintaining a predetermined 'comfortable' inside temperature. The calculation of degree days for any given period is effected by multiplying the number of days involved by the difference between the actual outside temperature and an arbitrary standard outside temperature of 60°F.

Since the gas industry is interested in large-scale central heating by gas-fired central heating boilers and the supply of coke, it was with very great interest that we read an article published in *Fuel Economy Review* for 1958 entitled 'The Calculation and the Use of Degree Days.' In this article the author explains in simple language the basis for the calculation of the degree days and some of the difficulties to be encountered in finding a reasonably accurate figure for the temperature difference between the inside and outside of the building during 24 hours, since this is continually changing from hour to hour.

A straight average would not give a true value, but with the help of the Meteorological Office, which has for many years used formulæ for calculating accumulated temperature above a fixed atmospheric temperature, a satisfactory means of calculating this temperature difference was arrived at. Most of the early work on degree days was done in America where the 'comfortable' temperature inside a private house or office building is considerably higher than it is in this country. In the U.S.A. the 'comfortable' temperature is taken as 70°F., while in Great Britain, 65°F. is considered more applicable. Calculations had to be made for this lower temperature. If the conception of degree days is applied to the heating of a building, a very interesting fact emerges—the quantity of fuel consumed per degree day remains almost constant. In an investigation of the weight of coke being burnt in a certain fuel system, although the actual weight burnt between October and March varied between 8½ and 22 cwt. per month, the weight per degree day only varied between 4.3 and 4.1 lb. The use of degree days can also assist in the estimating of the customers' requirements.

For the heating calculations to be reasonably accurate

it is necessary for the period over which the calculation is made to be as long as possible, this should not be less than a month. Before the forecast of fuel consumption for the ensuing heating season can be made, the conditions over an even longer period should be carefully studied. It is considered that a reasonable accuracy of forecast would be about ±8%. Seasonal temperatures are likely to vary from year to year, and these seasonal differences may have a very profound effect on the fuel consumption of space heating plant.

In order that such differences may be taken into account, the Gas Council issue monthly figures for the total number of degree days during the heating season between September and May, calculated on a base of 60°F. Although this is likely to be the most applicable basic temperature, the temperature of premises used only during the day is often allowed to fall considerably below 65°F. during the night and at weekends. This may make it necessary to use a different basic temperature during these periods, if an accurate calculation is to be arrived at for individual installations.

In spite of all these deviations and the difficulties arising from variations in winter temperatures, we think that the conception of the degree day as a basis for the calculation of fuel consumption and the design of centrally heated space heating installations does offer a means of establishing a standard from which to work.

This may be of great importance to the gas industry in the future if the production of gas tends more and more to be dissociated from coke production.

Working Results at Denton

FROM time to time papers are published on the working results of new processes of gas making which have been installed by the gas industry since the war in an attempt to solve the problems caused by rising costs of coal and labour. Hitherto very little has been published dealing with the running of thermally integrated carbonising plants other than descriptions of the layout and the type of electrical plant installed to make the best possible use of the waste heat recovered. Such a detailed description of the plant at the North Western Gas Board's works at Denton was published in the 'GAS JOURNAL' about two years ago. In this issue we are publishing a paper by Mr. H. Dobson, Deputy Station Engineer at Denton, which he has called 'Producers and Power.' In it Mr. Dobson describes in some detail experiments at Denton which have been carried out with several gradings of coke in the Wellman-Galusha producers, which are in themselves an unusual type to be installed at a gasworks. These experiments show the capabilities of such producers, both in terms of high thermal yield of a gas of suitable calorific value and of their being able to stand up to more sustained and rigorous working conditions than are expected of them in the steel works where they are usually found.

Denton works must be one of the very few 'all electric' gasworks, where the only steam prime movers are the waste heat steam turbines and the boiler feed pumps. Should the turbo-generators fail at the same moment as the supply from the Central Electricity Authority, therefore, the works must necessarily come to a standstill. This is a big responsibility for any station engineer to face.

On a works such as this, maximum demand for power when all ancillary prime movers are working, presents a formidable problem; and at this particular works would appear to be connected with the economic working of some of those ancillaries at off-peak hours, possibly coaling at night for example. As Mr. Dobson made clear in the discussion after his paper, certain ancillary plant, such as the compressors which supply gas to comparatively remote areas where the demand is virtually outside the station engineer's control, present a special problem. The question arises whether the compressors should be connected by a separate circuit to the C.E.A. supply to avoid the extensive maximum demand at times of peak load. This would result at more normal times in surplus power being generated to be sold back to the C.E.A. at a price that would not cover the standing charges of the separate circuit. Mr. Dobson describes the use of the augmentation flue by which producer gas may be taken directly from the producers and be burnt under a waste heat boiler to raise additional steam should this be needed at times of high steam demand.

This paper is quite clearly a technician's paper and is most interesting to anyone who has followed the developments that have been taking place since nationalisation in heat and energy conservation.

Cooker Evolution

WE have on previous occasions emphasised the debt which the industry owes to its manufacturers. After all, the bulk of appliance development is carried out by them and the sales impetus of the industry would be much weakened without their activities in the field of publicity and advertising. And yet, all too often, they seem to be taken for granted and are regarded merely as people who are trying to sell something to the gas boards, instead of partners (working ones, not the sleeping variety) in a co-operative business. Talking as we do to sales personnel at all levels we sometimes wonder at the way in which a new appliance on the market seems to be received. There is a tendency to look for possible faults rather than praise the maker

for having a go at strengthening the competitive position of gas as a fuel. We would go so far as to suggest that if the industry's salesmen tried as hard to improve their selling technique as the maker tries to improve his product, we should all be in a very much happier position today.

We were reminded of all this by the introduction last month of two new cookers, one gas and one sold fuel. In both cases the makers' determination to achieve something new and promising is clearly apparent. Take the 'Prince,' latest product to emerge from the Parkinson-Cowan stable. Here is a cooker selling at fractionally more than £40 which can boast high level grill, automatic ignition on the hotplate and an oven which has already proved itself on the Renown Six. Most interesting of all is perhaps the compromise which has been effected between the low splashback, which we are told is currently popular, and the high (the eyes no longer have it!) grill. Whether the latter feature will delight the housewife we do not know, but at least it is evidence of a restless desire to improve the sales appeal. In due course the 'Prince' will be eclipsed by something else, either from the same company or a rival, but the process of evolution will be carried on.

We hope gas salesmen will not dismiss Radiation's new 'Yorkmaster' as being of little interest just because it operates on solid fuel. In the first place the gas industry—let it not be forgotten—supplies solid fuel and thus an appliance such as this which is designed in such a way that it will operate on downdraught with coal and updraught with coke is of importance. After all, like the coke boiler the solid fuel cooker is an appliance which is in more or less continuous operation. As such it constitutes a steady market for coke—when coke is burned. Unfortunately, as we all know, coke is by no means always the first choice of the householder, frequently because the appliance in question has been designed to burn a variety of fuels and this flexibility tends to work to the detriment of coke. Here, however, is an appliance which can be made to change its whole method of burning when coke is used, and for this reason it is to be welcomed. Moreover, it goes further towards achieving guaranteed cooking conditions than any other solid fuel cooker; as such it is a most interesting example of appliance design.

Both these new appliances are described at length in the July issue of *Gas Service*, which also contains a specially prepared at-a-glance guide to available cookers. A total of 46 are listed and the dimensions and selling features supplied.

Personal

MR. NORMAN C. STURROCK, General Manager of the York-Harrogate Group of the North Eastern Gas Board, has been installed as President of the Harrogate Rotary Club. On the same day, MRS. STURROCK marked her birthday by being invested with the Presidential chain of the Harrogate Inner Wheel Club. This is the second occasion in the history of the Rotary Club, founded in 1920, and the Inner Wheel Club, formed in 1934, that husband and wife have occupied the Chairs of the associated clubs in the same year.

MR. J. RATTER, C.B.E., has been appointed a full-time Member of the British Transport Commission, in succession to SIR LANSDALE TRAIN, who is to retire on September 30. The appointments have been renewed of SIR JOHN BENSTEAD, C.B.E., as Deputy Chairman, and of LORD RUSHOLME, and SIR REGINALD H. WILSON as full-time Members.

MR. W. G. PHILLIPS has been appointed Commercial Manager designate to the Eastern Gas Board, the effective date of this appointment to be announced later.

Good Progress

GOOD progress is reported on the Northern Gas Board's project to provide an underground storage space for about 10 mill. cu. ft. of gas in a worked-out salt well cavity near Haverton Hill on the north bank of the Tees.

LORD MILLS PAYS VISIT TO SOLIHULL

Inspection of Midlands Research Station Work

THE Minister of Power, Lord Mills, paid a private visit to the Midlands Research Station of the Gas Council at Solihull, last Friday, travelling from London in the morning and returning in the afternoon.

He was accompanied by Sir Harold Smith, Chairman of the Gas Council, and was welcomed on arrival by Mr. G. le B. Diamond, Chairman of the West Midlands Gas Board, which administers the Research Station on behalf of the Gas Council.

The purpose of his visit was to see at first hand the important developments taking place at Solihull in the manufacture of gas from oil and low grade coals. The Minister also met at lunch members of the West Midlands Gas Board.

Diary

July 11.—MIDLAND SECTION, I.G.E.: Wolverhampton. Summer Meeting and Ladies' Day. 10.30 a.m.

July 21.—WEST MIDLANDS G.C.C.: Edmund Street, Birmingham, 3. 2.30 p.m.

July 21.—EASTERN G.C.C.: Connaught Rooms, Great Queen Street, Kingsway, W.C.2. 2 p.m.

SHIPLEY'S FIRST SMOKELESS ZONE IS APPROVED

THE Minister of Housing and Local Government has provisionally approved the establishment of Shipley's first smoke-control area. The zone is at Saltaire, affecting 1,211 houses, and includes the whole of Saltaire village and the Urban Council's pre-war housing estate at Hirst Wood.

The Council is sending out circulars and booklets explaining the provisions of the Clean Air Act and the grants available towards the cost of conversion of appliances for the burning of smokeless fuels. These will be followed by visits from health inspectors to survey individual needs and advise householders.

A trial survey, already carried out, indicates that the adaptations necessary in the case of the 900 private houses affected will cost £7,700 and of the 300 Council houses £1,400. Private householders will pay 30%, the Council 30% and the Government 40% of the cost of conversions. In the case of the Council houses the Council will pay 60% and the Government 40%.

Radiation Ltd.

Acceptances were received in respect of over 94% of the Ordinary stock of Parnall (Yate) Ltd., up to the date of the closing of the offer on June 30 made by Radiation, Ltd.

Northern Juniors Annual Meeting

President Speaks on Staff Problems

IN his Presidential Address to the tenth annual general meeting of the Northern Junior Gas Association, Mr. G. W. Robson, speaking on the problem of attracting the right type of man to the gas industry, quoted from the editorial comment of the February 5 issue of the 'GAS JOURNAL.'

'The attracting of the right type of man is the responsibility of the management, but whether or not we keep him, and what is most important, obtain the best possible results from his services, will depend almost entirely upon his foreman or supervisor,' said Mr. Robson. He continued, 'An article in one of our trade journals, published quite recently, has this to say about the foreman. I quote:

" . . . The real key of productivity today is not mechanisation, neither is it work study, nor cash incentives nor controlled employed. The key is the same as it has always been—the foreman, the most influential person on the industrial scene. . . ."

Important Role

'You may or may not agree with that statement. I consider that there is a great deal of truth in it, and in works of the type with which we are concerned, I am convinced that the foreman or supervisor has a most important rôle to play in the efficient use of labour. It is the foreman who from day to day has the closest relations with the men, he has the responsibility for keeping together a willing and trained team of workers, and it is generally the foreman who has the last word to say in engaging and discharging labour.'

The inevitable closing down of the smaller units and the concentration of production in fewer and larger works are throwing the spotlight more and more on to the problem of increased efficiency of operation of those works remaining in production, Mr. Robson had said earlier.

In the face of continued rising costs, it was essential that the best possible use be made of material and especially of one of the most expensive—labour. Time was when labour was one of the easiest and cheapest of commodities to obtain. That was no longer the case and might not be for many years to come; the works manager who could say he had no labour difficulties was indeed forunate.

Mr. Robson said he was not thinking solely of manual workers. 'Today we in the gas industry must compete in the open market for the type of employee we required,' he continued. 'Competition for the good man is severe and, generally speaking, the conditions of work in a gasworks do not compare favourably with those in a modern factory.

'How, then, should we set about attracting the right type of man and, having encouraged him to enter our employment, how do we keep him and obtain the best possible return from his services?

'The immediate attractions are, I feel, the rate of pay for the job, the prospect of improved earnings due to a modicum of overtime, security of employment, and by no means least of all, the best possible working conditions and amenities that we are able to provide.

Responsibility

'Rates of pay, hours of work, issue of protective clothing, etc., are governed by national or regional awards and are not the immediate concern of works management, but conditions under which men are expected to carry out their duties efficiently are definitely within their province.

'The continued search for improvement in working conditions has led to the growing development and installation of mechanical aids and equipment. These in their turn call for a higher degree of skill and intelligence and know-how.

'The type of man we require will not be content to work in unpleasant surroundings whether the conditions are caused by cramped working space, bad atmosphere, or inadequate facilities for the maintenance of personal cleanliness and comfort.

'It should therefore be our constant endeavour to improve the layout of plant and machinery with a view to giving the best possible access for routine inspection, cleaning and maintenance, to maintain a high degree of cleanliness and comfort in the workshops and messrooms, together with adequate facilities for washing, changing of clothes and so forth.

Good Ambassador

'One of the best ambassadors we can have in recruiting labour is a satisfied employee. It should always be borne in mind that it is extremely difficult and expensive to keep a large gasworks clean and tidy at all times, but it is essential that the necessary steps be taken to do so. Only by setting a good example can you encourage men to follow suit. On the other hand, however, it is surprising how quickly they will follow the example of an untidy fellow workman. . . .

'The great majority of our works foremen, especially general and shift foremen, have spent a considerable part of their working life in our industry, and have graduated to their present positions after having tackled almost every job on the works. They are always extremely interested in works operations and results, but I do feel that they are not fully equipped to deal with labour under present-day conditions.

'The day has gone when the foreman had in his hands a real weapon for imposing discipline; full employment has removed the fear of the sack, and at the same time has tended to reduce the foreman's authority.

'So the problem of efficient control and direction of labour will of necessity have to be solved by some other means. The "other means" cannot be produced immediately, but can only be the outcome of systematic training in man management and supervisory skill.

'There have been a number of publications on the subject of recruitment and training of supervisors, all of which make very interesting and enlightening reading. One of the main points which to my way of thinking emerges from a study of some of these publications, is that industries must plan their training programme to suit their industrial needs and circumstances. There is no overall method of training.

Careful Consideration Needed

'The selection and appointment of a foreman to be in charge of skilled or unskilled workers should be made only after a very careful consideration. The post is so important that we should not expect to be able to upgrade one of our manual workers, but should prepare by training, selected personnel to take over foremen's jobs as they become vacant.

'This presupposes that the status, authority, and remuneration given to a foreman must be such as to encourage others to seek promotion to supervisory rank. A point we should consider is whether or not the recruitment of foremen from the ranks of our own employees would not tend to lead to a form of stagnation—without additional training their knowledge will be limited to what has been passed on to them by their fellow foremen. It would have to be part of our training scheme that prospective foremen were given the opportunity of spending some time actually working in other works in the area.

'If, eventually, we are satisfied with the technical ability and qualities of leadership of the man chosen for the foreman's job, we must do everything possible to assist him in carrying out his duties effectively.'

These duties, said Mr. Robson, could be summed up as seeing that the work for which he is responsible is carried out as planned by the management; that discipline and safeguarding of property of the employer is maintained; that some part is taken in training new entrants; and that management is kept informed of conditions in his department.

'It should be realised also that to the employee the foreman represents management and employees' judgment

of the firm will be made by the impression which the foreman makes upon them,' continued the President.

'In what way, then, should management assist with these duties? In the first instance it is essential that adequate facilities be provided for carrying out his office work. Too often in the past we have seen the small "cabins" dotted about the works, each the home of a foreman or chargehand, its main equipment comprising a gas ring and an old desk, the latter generally rejected from the works office.

'Here he is wont to retire to write up his reports, have a meal and change to and from working clothes. What he really needs is accommodation in a central position in the works, equipped in such a manner that he is able to have readily accessible all records of jobs and other information which he needs.

'Secondly, he must be kept fully informed of the future overall plan for the works and of the short term policy. For example, he should be made aware well in advance if possible, of any changes envisaged in operation, of dates of starting constructional jobs and of times when special jobs are to be undertaken.

'Only if he is given this information is he able to rearrange his team of workers with the least inconvenience to all concerned and have the necessary time to plan the best and most efficient use of his labour force. Hurried redeployment of labour is invariably expensive and frequently leads to friction of one kind or another with the result that work is slipshod and inefficiently carried out.

'Thirdly, it is essential that good lines of communication be established so that instructions issued from management to foremen and from foremen onwards do travel through the right channels and are readily understood by those concerned. Lack of true understanding of what is required, or the refusal by a foreman or chargehand to accept instructions received through the wrong channel can waste endless time and cost no end of money.

'In our larger works we generally have three or four foremen and supervisors on day work with shift foremen in addition, and if we wish to foster a team spirit among these men, I suggest we give them facilities for meeting under one roof—a sort of common room for foremen—where they can discuss their various problems, get together on the efficient use of labour, make communications between departments easier, and foster a good team spirit among all supervisors.'

The meeting was preceded by a luncheon at the invitation of the Northern Gas Board. Following the luncheon the President welcomed members, particularly the Chairman of the Board, Mr. E. Crowther, and Mr. F. J. Webster, Chairman of the North of England section of the Institution of Gas Engineers.

Mr. Crowther, in replying, promised the full support of the Board to the Association's activities, and said the Association gave great assistance in the training of technical personnel; it was of interest to note the number of senior vacancies which had been filled by Association members.

Officers elected for the current year were:—President, Mr. R. S. Longhurst, Carlisle; Senior Vice-President, Mr. H. Waiton, Howdon; Junior Vice-President, Mr. G. E. Haddon, Stockton; Hon. Secretary, Mr. R. Proud, West Hartlepool; Hon. Treasurer, Mr. G. H. Ling, Darlington; Hon. Transactions and Publicity Secretary, Mr. R. J. K. Shepherd, Carlisle; Members of Council—Mr. W. O. Kirkwood, Sunderland, Mr. L. Nelson, Blythe, Mr. J. R. Matthew, Shotley Bridge, Mr. J. T. Lewis, Sunderland; Northern District Education Committee, Mr. P. N. Lee, Middlesbrough, Mr. A. Ruddick, Sunderland.

Three memebers were elected to the Northern District Committee—Mr. P. N. Lee, Middlesbrough, Mr. A. Ruddick, Sunderland, Mr. L. Nelson, Blythe.

The Council nominated Mr. F. J. Webster (Stockton) Chairman of the North of England Section, Institution of Gas Engineers, and Mr. J. R. Matthew (Shotley Bridge) Honorary Secretary.

The S.B.G.I. Silver Medal was awarded to Mr. H. Waiton, Howdon, for his paper on 'Things Mechanical.' The A. C. Hovey Medal and Award was awarded to Mr. C. J. Sanderson, Howdon, for his paper on 'Heating of a Modern Vertical Chamber.'

The retiring President handed over the chain of office to the incoming President, Mr. R. S. Longhurst, who presented Mr. Robson with a certificate of his year of Office.

The Vital Role of Asbestos Pipes

COMPANY PRODUCES 100,000 MILES IN 30 YEARS

IN the widespread improvements in recent years to piped water supplies, asbestos cement pressure pipes have played a leading rôle. Asbestos is an indestructible mineral which occurs naturally in fibrous form. Finer than silk, yet tough and flexible, asbestos fibres are ideal for the reinforcement of the portland cement with which they are mixed in the manufacture of asbestos cement pressure pipes.

Asbestos fibres not only provide substantial reinforcement in the pipe wall, but enable a special manufacturing technique to be employed whereby the pipes are built up on a rotating mandrel from a continuous film of asbestos cement. The pipe wall is thus comprised of many laminations each consolidated one on top of the other by substantial pressure applied through the operation.

The pipes so formed possess certain characteristics which provide the near perfect combination for water, sewage and allied industrial applications. These include strength, resistance to corrosion, freedom from electrolytic action, low frictional resistance to flow, freedom from encrustation, thermal insulation, flexible joints, light weight, and simplicity and economy.

Although relatively light in weight, the pipes possess ample strength to meet all the mechanical requirements of a water main, whether laid below or above ground. The pipes attain a very high proportion of their potential maximum strength within the first few weeks of manufacture. They are made for test pressures up to 800 ft. head and incorporate a liberal margin of safety.

From practical experience gained over many years by one firm of manufacturers, Turners Asbestos Cement Co., Ltd., operating under the trade name Everite, it has been found that asbestos cement pressure pipes are immune from external attack, even when laid on soils aggressive to other materials. They are also immune from the corrosive effects of stray electric currents. More than 100,000 miles of asbestos pipes have been supplied by this Company during the past 30 years for use at home and overseas.

Asbestos cement pressure pipes are ideal for conveyance of all types of hard and soft potable waters, sewage, brines, etc., and even after years of use, the bores are unaffected by encrustation or tuberculation, thus eliminating any need for scraping of mains.

While immunity from attack by concentrated acid is not claimed, it has been found that they are highly resistant to chemical action, and over the years have been used for a wide variety of industrial applications.

As the bores of asbestos cement pressure pipes are exceedingly smooth and suffer no reduction in effective area, even after many years of use, the initial low frictional head loss and high carrying capacity remain virtually constant. Thus it is possible to calculate the optimum pipe diameter without the need to allow for extra bore to compensate for subsequent reduction in carrying capacity.

Joints used with asbestos cement pressure pipes are of flexible type with rubber ring seal and are of either asbestos cement or cast iron construction. The asbestos cement joints are made from the same material as the pipes, and being entirely non-metallic are of particular advantage where aggressive soil conditions are encountered.

The flexibility of the joints enables easy curves to be negotiated using straight pipes, and at the same time allow for movement of the pipes under natural ground settlement.

'N.C.B. Still Requires Recruits'

DEPUTY CHAIRMAN CLARIFIES SIGNIFICANCE OF THE BOARD'S TEMPORARY RESTRICTIONS

SPEAKING at the annual dinner of the Institution of Mining Engineers in Birmingham recently, Mr. J. Latham, Deputy Chairman of the National Coal Board, said the fact that the Board had found it necessary to impose temporary restrictions on recruitment at many collieries, combined with the existence of coal stocks, seemed to have created an impression that recruits were not wanted by the industry, and to have caused doubts about its long-term future.

'We should make it clear that in several coalfields, particularly those of Yorkshire and the Midlands, we require a great many recruits and that in almost every coalfield there are pits where we need men immediately,' continued Mr. Latham. 'Moreover, throughout the industry we want to maintain the flow of boys into the mines, and we believe we can offer them better training and better prospects of a satisfying career than ever before.'

Mr. Latham also said that after a long period of struggling for every ton of coal to chase the ever-increasing demand, they had seen changes in the markets, and had become conscious of the competition of other fuels and the improvements they must obtain if they were to maintain and develop the industry. For 11 years or so 'quantity' had been the key word, but now they received practical reminders every day of the importance of the words 'quality' and 'price.'

'The problems are serious, yet in many ways the present situation is more satisfactory than the old one. There was little hope of progress in an extractive industry when we could not meet the increasing demand and were compelled to take various kinds of uneconomic measures in our search for the extra ton of coal.

'Now we have the opportunity to work for increased efficiency and for profitable production. Faced with disposal and financial problems, the Board have made important changes—the suspension of Saturday work, the restrictions on recruitment, the limitation of overtime working, the closing of a limited number of uneconomic pits and the standstill on non-operational expenditure. I am glad to say that the measures are achieving promising results and with full co-operation we can safeguard a healthy industry.

'For this reason we should not be pessimistic, despite the unpromising market situation and the certainty that we face a long hard struggle with competitive fuels. But there are obvious dangers in the field of human relations. It would be a great mistake to act as though the pendulum had swung back, not merely in the supply-demand relationship, but also in the measures we think appropriate to deal with the coal surplus.

'It is vital that our proposals and actions should show our determination to be fair to those employed in the coal industry and to adopt measures which preserve terms and conditions of work and do not harm the stability of employment. Restraint is essential, since the relationships within the industry which develop in the immediate future may settle a pattern for many years to come.'

Hodgkinson Group of Companies

THE firm of J. & J. Neil (Temple), Ltd., combustion engineers, of Temple Park Iron Works, Glasgow, W.3, which has been acquired by James Hodgkinson (Salford), Ltd., has been appointed sole representatives in Scotland for Bennis Combustion, Ltd., Little Hulton, Walkden, Manchester, and Bennis Mechanizations, Ltd., and Saxon Engineering Co., Ltd., both of Fenton, Stoke-on-Trent. All are members of the Hodgkinson Group of Companies.

Mr. J. Douglas Cooper, Chairman of J. & J. Neil (Temple), Ltd., will personally supervise this representation.

The London office of Bennis Combustion Ltd., Bennis Mechanizations, Ltd., and Saxon Engineering Co., Ltd., has been moved to Brettenham House, Lancaster Place, Strand, W.C.2; telephone: Covent Garden 2188/9, telegrams: Bennis Souphone London. These are also the London office address and telephone number of the Parent Company, James Hodgkinson (Salford), Ltd.

Replacing Steam

The use of natural gas as a substitute for steam as atomising agent in firing oil fuel to open-hearth furnaces is reported to have been successfully developed in the United States.

33 COMPETE IN ANNUAL R.A.M.S. GOLF CONTEST

THE annual open meeting of the R.A.M.S. Golfing Society took place recently at the Richmond Golf Course, Sudbrook Park.

Thirty-three competitors entered the Stapleford Competition against bogey which was won by Mr. D. M. Foulis (Southern) with 37 points. Second was Mr. W. Paterson (Eastern) with 36 points. Mr. A. S. Allan and Mr. J. M. Andrew, both of the R.A.M.S. tied for third place with 35 points each.

Two additional prizes were also awarded to runners-up with handicaps of under and over 15. Winner of the under 15 prize was Mr. M. Moore of Eastern with a score of 34 points. Mr. S. A. Grummitt, R.A.M.S. with 33 points was the winner in the over 15 section.

Consolation prize was won by Mr. M. Crouch (Eastern).

GAS COOKERS TRAVEL TO EIRE BY AIR

Pictured above, Radiation Cadet gas cookers bound for Eire are loaded by fork-lift truck aboard an Aer Lingus freighter at Manchester Airport, ready for their flight to Dublin. Only light cardboard protection is needed for each cooker. The manufacturers, Wilsons & Mathiesons Ltd., of Leeds, claim that air transport between Yorkshire and Ireland is less expensive than road, rail, and sea. This is based on careful cost analysis which takes into account savings on packing materials, time, damage in transit, insurance, customs clearance, and delivery to stockists.

REDEPLOYMENT OF LABOUR

A Special Correspondent Describes a Problem of Continuing Vital Concern to the Gas Industry

UNEMPLOYMENT is a word of unhappy and bitter connotation. The echoes of widespread unemployment which obtained before the last war are still heard in several industries. The lack of planning and foresight on the part of the Government and the employers which, for example, caused the proud race of Welsh miners to sing in London gutters for pennies has had to be dearly paid for in bitterness in the industrial relations field of the coal industry. It is shown by lack of co-operation, by a deplorable plethora of unofficial strikes and inadequate production. All this inherited resentment may well have to be paid for for generations to come.

But we are not concerned here with unemployment as such, but with redundancy. There is, of course, no strict line of demarcation, because a redundant worker can be actually unemployed, and unemployed for a long time. But when we speak of unemployment, it might mean that some employees have been sacked for inefficiency or incompetence or insubordination or they might be looking for their first job. Whereas when we speak of redundancy, we usually mean the action of management in dismissing a man not necessarily because of any personal deficiency in the employee, but because of a decline in trade, or of the need to increase efficiency by integration or some other form of rationalisation.

No Control

It is a misfortune over the incidence of which the employee has no control at all. It is no answer to aver that many of the employees rendered redundant are of little value to the firm anyway; if they have been on the firm's books for some time, then they should have been dismissed long ago. For an employer to come forward at a late stage and say that redundant employees are lacking in proficiency anyway is merely to advertise the bankruptcy of management. It must be assumed that if an employer has kept a man on his books for a long time, he has regarded him as proficient in his job. To try to justify redundancy on the ground that he is inefficient is to add insult to injury. It smacks too much of the dreadful spectacle of a judge in a criminal court moralising to a man whom he has already condemned.

Jungle Warfare

The general background against which redundancy must be regarded is the movement since the turn of the century towards larger and larger organisations—the swallowing of the smaller fish by the larger fish, a sort of jungle warfare of the survival of the fittest. For economic laws know no sentiment. In that respect they are like the laws of nature. Their edict is: Adapt yourself to changing circumstances or perish.

This process of amalgamation and integration and of general rationalisation is bound to have profound effects on the individual at all levels—some managerial classes might find themselves redundant just as easily as the other classes of employees. The advancement of technological and scientific invention demands constant change and adaptability—a readiness to try and adopt new methods, new processes, new inventions. So far so good; the difference between life and death in all its forms is the possession of this dynamic approach to our surroundings; in the human field, the possession of the feeling that life is an adventure, a fight against odds, a struggle against difficulties.

Impracticable

But humanity cannot stop there. It is all very well for certain rugged individualists to preach the doctrines of '*sauve qui peut*' and '*laissez-faire*.' As a naked principle, it just does not work out in practice. Even on a desert island, Robinson Crusoe would have perished without his Man Friday. Wherever there are two or three men gathered together, social obligations arise, and have arisen from time immemorial. Even wild and savage beasts protect their young and helpless, and hunt in packs. There is no such creature as a self-made man. He is where he is by virtue of all the facilities that society has put freely at his disposal, in the way of protection and education and welfare, just as much, if not more, than by virtue of his own individual efforts.

Moral Fibre Needed

There is need of a balanced view in all this. In the ethical sense, there is need to preserve the moral fibre of the individual—his determination and capability of looking after himself, rather than acquire a maudlin and sentimental attitude towards himself, a sort of unhealthy self-pitying. In the political sense, we live in a democracy—and democracy means government of the people, for the people, *by* the people. If we wish in the Hegelian sense to create an almighty state which is going to do everything for us, then we have lost our personal freedom, and we will find ourselves slap inside a totalitarian state.

That is why it is so essential to clear our minds about what is meant by full employment. Full employment does not mean, and cannot mean, complete and absolute security in the particular job that we are doing. It does not imply, and could not possibly do so, that once we are in a particular job, we can sit back with the comfortable thought that we can never become unseated. A little reflection will show that that would mean complete stagnation.

What full employment means is that if we lose our

job, and we are fit and able and adaptable, the term which elapses between losing our former job and finding a new one is not unduly prolonged. There is, therefore, no contradiction between this conception of full employment and that necessity for flexibility and adaptability which, as we have already seen, modern industrial and commercial activity demand.

We have already assumed that an individual, by his own unaided efforts, cannot always cope with the dislocation and upheaval often occasioned by the onward march of progress and invention. He needs help and assistance from other sources. Whose responsibility is it to give this help? First of all, he is a member of society, and, therefore, society must help him. And society can, and does, in this country give him very considerable help. The Welfare State, by means of unemployment benefit and public assistance, assures a minimum standard of living. By its planning through development area policy it can encourage factories to move to depressed areas; and by means of its training centres, it can train people to acquire new skills to fit them for new jobs. By means of its employment exchanges, if it is notified in time, it can tackle the problem of redundancy in its earliest stages and minimise, if not, sometimes, entirely eliminate the incidence of undue hardship.

Industrial Community

Industry is also a community, or should be. The head of that community, namely the employer, cannot shed himself entirely of responsibility about the future of those whom he has declared redundant. In the first place, it behoves him to inform the local officer of the Ministry of Labour of potential redundancies at the very earliest possible moment, to enable the employment exchanges to put their machinery into action to place those finally declared completely redundant, in other jobs.

Alternative Work

Secondly, he should make every effort to find, wherever practicable and feasible, alternative employment, within his own organisation, for displaced employees. Thirdly, he must have early and continuous consultations with the trades unions concerned in order to see that redundancies are put through with as little hardship and misgiving as possible. Fourthly, he must be aware of the general principles governing the operation of redundancy—for example, the principle of 'last in, first out,' with all the modifications thereto that are necessary and unavoidable. Lastly, in the case of the longer service employees, he must seriously consider the desirability and advantages of establishing some principles of compensation.

Understandable

That long-service employees should receive special consideration is entirely understandable and justifiable. Wrongly or rightly, such employees have come to regard their employment as of a permanent character. They have also given of some of their best years to their employer, and he should not, therefore, cast them callously aside. Furthermore, such conduct would provide a grievous blow to goodwill both inside and outside the undertaking, which would prove very costly to the present and future prospects of the undertaking. Such conduct would be a boomerang in the field of future recruitment and in the voluntary exodus of the more valuable employees.

It can be said generally of trades unions in this country, as it could long be said of trades unions in the U.S.A., that they are not opposed to, and do not stand in the way of, technological improvement. They normally recognise that technological advance and the resultant increasing productivity are necessary in order to maintain and improve the present standard of living. At the same time, they wish to see employees getting a fair share of the benefits of increased productivity.

Must be Notified

But they point out that they cannot very well co-operate unless they are notified and consulted well in advance. They would like to work out jointly with management the procedures and methods which ought to be taken in advance in order to cushion or eliminate any potential adverse effects on the employee. They contend that this is greatly to the advantage of management in that thereby it greatly facilitates the transition to, and gives readier acceptance of, technological changes on the part of the employee.

Two Prime Causes

All sorts of factors can lead to redundancy, but mechanisation and automation are two of the prime causes. But their effects can be, and are, grossly exaggerated in certain quarters. After all, relative to primitive times, they are the causes which have led to the present relatively high standard of living and to the vastly increased opportunities for employment. In the long run, they usually lead not to the reduction in the number of workers, but to a greatly increased labour force. Furthermore, they cannot be introduced all at once. Large capital investment is required and they can affect only the minority of jobs.

Long Planning Needed

Also the planning required for their introduction takes a long time to work out. Indeed, the firms which have redundancies to fear are those which avoid the introduction of increasing mechanisation and automation. They will find their competitive position increasingly weakened. Mechanisation and automation should be regarded, therefore, by those who grasp the opportunity of introducing them, not as bogies but as friends. They are not enemies if we offer them the hand of welcome; it is only when we turn our backs on them that they will destroy us.

Another cause is integration and rationalisation; for example, by the absorption of uneconomic units by economic ones. This is going on apace in the gas industry, and is unavoidable in the cause of strengthening its competitive position and thus ensuring its vigorous survival. But here again, these things have to be planned well in advance. They often enable employers, as has generally been the case in the gas industry, to solve redundancy by normal wastage and control of recruitment. Other reasons are serious seasonal changes in demand and a serious and con-

tinuing decline in demand. The gas industry is relatively free of such vastly disturbing influences, but not always entirely free.

Another cause might be Government policy, such as, for example, the policy of the present Government in restricting capital investment and in controlling credit generally. No industry is unaffected by such a policy, and least of all the nationalised industries. The difficulty with Government policy for the business man is that it may be dictated by other than purely economic reasons, so that its incidence and extent cannot be confidently anticipated by the trader. It thus renders long-term planning of redundancy very difficult.

Priorities

As has already been pointed out, the main principle generally accepted as governing the operation of redundancy is length of service. But this principle, according to circumstances, might have to be modified in many ways. Part-time workers may have to go before full-time workers, because the former did not expect to be on the permanent establishment and usually have other sources of income; for example, through their husbands. Aliens may have to go before British citizens, despite greater length of service. The grossly inefficient and the chronic absentees cannot expect the same treatment as the conscientious and the capable. Sometimes the younger employees are declared redundant rather than the old—especially the disabled—on the ground that the former can much more easily find alternative employment.

Hardship

Other factors which protect certain employees are hardship or whether they are key-workers and thus difficult, if not impossible, to replace. In other words, while the main principle of seniority of service should be observed, it often has to be modified to suit the particular exigencies obtaining in a particular undertaking.

This question of long service is regarded as so important that many redundancy schemes stipulate that their provisions will apply only to those who have completed a stipulated number of years of employment with the undertaking.

Older Men

The question of personal hardship should always be a factor to be taken into account when deciding the list of redundant employees. Unemployment or diminution of earnings must fall very hard on men in their forties or fifties. Such men are usually still educating their children and buying their houses and furniture. Generally speaking, they are not so easily re-trained as their younger colleagues, and are not so ready to tear up their roots. Furthermore, their prospects of securing alternative employment are not as good.

Loss of prestige, too—such as that involved in taking a less skilled or lower-paid job—in addition to the loss of confidence in one's old skill are harder to bear. There is a moral obligation on the part of the employer to take this factor into account, for these are employees who have given him years of service, and find themselves redundant usually through no fault of their own. Certain pension schemes help in this direction in that the employer is enabled to retire older employees, in the case of redundancy, on pension at an age earlier than the normal retiring age, *vide* 'Redundancy,' (the Acton Society Trust, 5s.).

Wide Variations

Because, in this country, of the relative novelty of paying anything to redundant employees, it is to be expected that the bases of payment, where payment is made at all, vary widely. Where payment is made, it is normally based on the length of service of the employee concerned. There appear to be three kinds of compensation payments. One is for loss of employment as such, with the corollary, loss of future expectation of remaining in that job and obtaining possible promotion. The second is to lighten the financial loss involved between losing one job and finding another. The third kind of payment is to encourage the employee to stay in his job so as to enable the employer to complete his new reorganisation.

Two Industries

It is sufficient for our present purpose to confine ourselves to two industries in the public sector: In the electricity supply industry where, as in gas, there is statutory provision lasting ten years for people suffering loss or diminution of earnings consequent upon the operation of the Acts of 1947 and 1957, so long as the loss arises within the period of ten years. In the case of redundant manual employees who cannot be found alternative employment, and have had four or more years' continuous service in the industry, and who cannot be compensated under the Acts, payment of a sum is made, equivalent to one half of the period of normal notice for each year of service subject to a maximum of 12 times the payment for the period of normal notice. The gas industry is exceptional in that the National Joint Industrial Council for the Gas Industry negotiated as far back as 1930 a redundancy agreement. Under this agreement, compensation was paid after three years' service up to 45 years of age at one week's pay for each year of service; at 50 years of age or over compensation rises to 2 weeks' pay for each year of service. This scheme applied to private as well as to municipal undertakings. When the industry was nationalised in 1949, regulations were made under the Gas Act of 1948 whereby compensation is payable to employees with at least 8 years' continuous service before vesting date who become redundant as a result of nationalisation. These regulations expire in 1959 and further arrangements are under discussion. See the Acton Society Trust publication already mentioned.

Well Worth While

It is well worth while, even in the strictly material sense, for the employer to treat redundant employees as generously and decently as possible. It may take half-a-century to build up good-will, but, owing to ill-advised or insufficient considered courses of action, it can be lost in the twinkling of an eye.

From a paper to the Manchester Juniors', Denton, May 10, 1958.

Producers and Power

By H. DOBSON, Assoc.M.Inst.Gas E.

DEPUTY STATION ENGINEER, DENTON UNDERTAKING, NORTH CHESHIRE GROUP, NORTH WESTERN GAS BOARD

I DEEM it a pleasure to present the first paper to be written concerning the operation of Denton works. One is tempted to expound at length on the plant as a whole, but this type of paper is rapidly losing favour. Two sections of this works which are unusual but not unique are: (1) The Wellman-Galusha producer plant, and (2) the absence of steam prime movers with the exception of boiler feed pumps and steam turbines.

Power generation is not the primary function of a gasworks, but if it is possible to generate the works load requirements and still have sufficient pass-out steam available for process work, ideal conditions are reached. The inter-relationship between producers and power is that ultimately the producer gas is the basis for waste heat steam. The paper will deal briefly with the producers, the distribution of steam and power, and the arguments for and against augmentation.

The installation is made up of eight producers in two groups of four. The producers are 10 ft. in diameter and each is equipped with a cyclone dust-catcher feeding into a common hot gas collecting main. Each producer consists of an overhead fuel bunker, a water-jacketed shell, a revolving grate and an ash hopper. The fuel bin is in two compartments. The upper or storage bunker holds 50 tons. The lower or pressure bin communicates with the interior of the producer through four 10 in. diameter steel feed tubes. The pressure bin is recharged at hourly intervals from the storage bunker through a centre valve, which operates in sequence with the valves on each feed tube, thus preventing an escape of producer gas during the charging of the pressure bin. The level of the coke in the producer is maintained by gravity feed from the pressure bin through the feed tubes.

Variable Extraction Rate

The producer shell is completely water-jacketed and sufficient steam is generated for blast saturation. The grate consists of three overlapping plates mounted one above the other and capped by a cast iron cone frustrum. The assembly is mounted eccentric to the centre bearing causing the ash to be forced between the grate plates and crushing any large clinker. The rate of extraction can be varied.

Air for the blast is supplied by motor-driven Keith-Blackman blowers and the flow is controlled on an Electroflo Series '55' regulator to give a constant pressure in the collecting main. Steam is supplied from the jacket and the blast saturation temperature automatically controlled by regulating the water supply. Gas passes from each producer into a cyclone dust-catcher and then to the collecting main, from which offtakes pass the gas to the four benches of retorts.

The dust collected is allowed to cool in a small hopper below the cyclone and then discharged into a trough conveyor. Air is blown through porous tiles into the trough and conveys the dust along to a conditioner where it is mixed with water, then onto a conveyor belt, which takes it to the ash receiving hopper. Ash from the grate passes through an ash bin via a water sealed discharge pipe onto a John Thomson ash conveyor and so to the ash receiving hopper.

The function of a producer plant is to give a continuous supply of clean gas at the right quality and pressure as efficiently and economically as possible.

Several Modifications

In order to give the producers an opportunity of achieving this objective, several modifications had to be made to the basic arrangement. The producer plant as proposed was ideal for steel-works practice, where the demands made are less exacting and working loads over a given period are much less. I do not propose to go into great detail about all the work done on this plant, that in itself is more than enough for one paper, but just to mention a few items, we: (a) Ensured gas tightness of all mains, valves, explosion doors, test points, etc.; (b) fitted spectacle valves behind all the main valves wherever possible; (c) fitted a mild steel box with refractory damper on a producer outlet in order to isolate the generator without relying on the mechanical valve. This proved a success and the other producers are to be fitted in the same way; (d) fitted extra dust drops along the common CO collecting main to prevent dust reaching the settings; (e) Stellite-welded the grate plate edges and the skirt plate to give longer life; (f) Repositioned the blast pressure controllers to allow three producers to be base loaded and control on the remaining one; (g) interconnected the blast mains between stages one and two to allow any combination of blowers to be used; (h) re-routed all vent pipes and ran them separately.

Sufficient has been written about the mechanics and chemistry of mechanical producers, and it is not my intention to add to this. We have found that a blast saturation temperature of 54°C. giving a steam carbon ratio of 0.5[1] gives best working conditions on this type of producer. Several trials have been carried out using various grades of coke and breeze at varying throughputs, and efficiency figures were obtained.

The first producer was put to work before the gas-making plant started heating up, and coke was brought

in from other works in the Group. This was horizontal coke screening 95% between ¾ in. and 1¼ in., and throughputs were reached of 44 tons per day, which gave a calculated gas load of 300,000 cu.ft. per hour, and the rating on the producer amounted to 54 lb. per hour per sq. ft. of grate area. The maker's recommendation was 24 cwt. per hour of ¾ in.-1¼ in. coke and, as we anticipated using coke containing 15% through ⅛ in. with a specification throughput of 20-22 cwt. per hour, it was decided to use the flow indicators with calibration showing 100% load at this throughput.

Trials were carried out using various mixtures of fuels as follows:—

(1) **Fuel No. 1** grading 94% over ¾ in. carbon content 92.5% on dry basis.
This fuel proved effective up to 120% of full load conditions and gave 90.6% hot gas efficiency with a gas rate of 166,000 cu.ft. per hour.

(2) **Fuel No. 2** grading 72% over ¾ in. and 17.2% through ⅜ in. carbon content 92.2% on dry basis.
At 88% load, i.e., a gas rate of 133,000 cu.ft. per hour, the hot gas efficiency was 90.8%.

(3) **Fuel No. 3** grading 61% over ¾ in. and 24.4% through ⅜ in. carbon content 90.8% on dry basis.
With a flow load of 90% giving a gas rate of 138,000 cu.ft. per hour, the hot gas efficiency was 90%.

(4) **Fuel No. 4** grading 70% on ⅜ in. at 12.5% through ⅜ in. carbon content 90.2% on dry basis.
At 100% load and gas rate 152,800 cu.ft. per hour, the hot gas efficiency was 87.7%.

(5) **Fuel No. 5** grading 55% on ⅜ in. 25% through ⅜ in. carbon content 89% on dry basis.
75% load giving a gas rate 113,000 cu.ft. per hour, the hot gas efficiency was 85.3%.

(6) **Fuel No. 6** grading 46% on ⅜ in. 32% through ⅜ in. carbon content 89% on dry basis.
Flow load 60% giving 87,000 cu.ft. per hour gas rate, the hot gas efficiency was 84.9%.

This fuel proved expensive from a manpower point of view and gave very difficult working conditions. The high hot gas efficiency figure is due to high offtake temperatures resulting in low c.v. gas.

A result of one test only is given as an example. Every fuel was tried at all loads from 50% to 120% always providing conditions allowed the load to be maintained. Throughout the duration of the tests, the figures were obtained on a working producer, and every effort was made to ensure normal working conditions.

TABLE I
Some Working Results from April, 1956, until December, 1957

Week Ending	Nov. 10 1957	Nov. 17 1957	Nov. 24 1957	Dec. 1 1957	Dec. 8 1957	Dec. 15 1957
Coal carb.	4,693	4,808	4,812	4,895	4,685	4,673
Throughput per ton ..	4·60	4·75	4·82	4·85	4·68	4·70
Make, 1,000 cu. ft. ..	92,717	95,382	95,040	99,840	93,561	92,725
C.v. B.t.u. per cu. ft. ..	450·0	449·3	454·0	453·7	449·8	451·0
Benzole, gal.	11,450	9,315	4,880	4,200	8,250	8,850
Therms per ton ..	92·90	92·78	91·34	93·85	92·83	92·49
Cu. ft. per ton ..	19,890	19,923	19,816	20,439	20,019	19,925
Therms per ret. ..	427	441	440	461	434	434
Cu. ft. per ret. ..	91,600	94,700	95,500	101,500	93,800	93,700
No. of ret.	1,021	1,011	998	1,008	1,002	995
Coke to prods. tons (wet)	670	690	700	750	690	690

The cost per therm of producer gas common to all types of coke used at the most efficient throughput is determined as follows:—

Three men per shift equals 10½ men per week. It is justifiable to rate a shift worker at £1,000 per annum, *i.e.*, wages, holidays, National Health service, sickness benefits, overheads, technical supervision, etc.

Item	*Cost* £	*Pence/Therm*
(1) Labour	10,500	.296
(2) Maintenance materials	1,500	.042
(3) Interest	10,000	.282
(4) Depreciation	6,300	.178
(5) Incidentals	500	.014
	28,500	.812

The cost per therm of producer gas is .812d., excluding fuel.

The pence per therm figure has been calculated on an air flow rate to the producers of 9,000 cu.ft. of air per minute, *i.e.*, five producers working at 100% load. This figure can be variable dependent on whether augmentation is being practiced or not. Without augmentation the producer load is less, say, 8,000 cu.ft. of air per minute and the cost then becomes .913d. per therm excluding fuel.

A table (in the original paper) contains a summary of all the tests carried out showing efficiencies and costs. It can be seen that in trial No. 4, using coke containing approximately 13% through ⅜ in., the cost per therm was 6.52d. for fuel. This is No. 4 coke and appears to be the most economical fuel to use, and certainly the best fuel from a disposal point of view.

Nominal Throughput

The carbonising plant consists of four benches of Glover-West continuous vertical retorts, each bench consisting of 40 retorts in five beds of eight. The setting is of the ' balanced heating ' type and the retorts are 50 in. major axis. The nominal throughput is five tons per retort per day, and at Denton we have had throughputs ranging from 4.2 to 5.7 tons per day.

The methods adopted for gas making have been as follows:—

(1) High throughput, low steaming, giving a c.v. ex-retort house of 520 and diluting with blue water gas to the declared c.v., *i.e.*, 5.47 tons per retort per day, c.v. 523, plus blue water gas of c.v. 280 and benzole extraction of 2.1 gal. per ton, giving a thermal yield of 92.5 therms overall. Make 506 therms or 109,000 cu. ft. per retort per day.

(2) Throughput of 4.68 tons per day giving a c.v. after benzole extraction of 452. Benzole recovered 2.09 gal. per ton, resulting in 92.84 therms per ton, 435 therms or 93,000 cu.ft. per retort per day.

(3) Throughput of 4.77 tons per day giving a c.v. ex-retort house of 504 B.t.u. per cu.ft., benzole extraction 2 gal. per ton diluted with blue water gas at a c.v. of 290 B.t.u. per cu.ft., giving an overall thermal yield of 92.8 therms per ton, 442 therms or 94,800 cu.ft. per retort per day.

Methods 1 and 3 are normally adopted because of the necessity to keep the effluent for disposal to a minimum. Method 2 was tried out at a period when stocks of crude liquor were fairly low and gas requirements were low.

Table I shows some working results from April, 1956, until December, 1957, under various load conditions;

Table II shows figures obtained for a continuous six-week period which appears to be a fair representation rather than to select odd weeks at random.

The following figures are of gas analyses taken during this period. Two samples of crude gas and one sample of town gas have been selected as an indication of results obtained.

TABLE II

	Crude Gas		Town Gas
CO_2	3·4	4·0	4·1
O_2	0·2	0·2	0·6
CnHm	2·2	2·3	1·8
CO	17·5	17·1	18·6
CH_4	20·4	20·5	18·7
H_2	53·5	52·3	48·8
N_2	2·8	3·6	7·5
C.V. calc.	497	496	448

A diagram was included in the paper showing the layout of the main water services.

The condensers use recirculated water in the first gas condenser and town water on the second gas section. The town water availability is dependent on the level in the cooling tower ponds, *i.e.*, if the level rises above the predetermined one, a float valve shuts off the town water main. Water from the cooling tower pond is pumped to the producer header tank and circulates through the producer annular boilers. At a blast saturation of 54°C. four gal. of overflow water per 1,000 cu.ft. of gas generated are required for the jacket. This gives a quantity at the present time of approximately 30,000 lb. per hour of overflow water which is collected separately and pumped to the boiler feed tank. Condensate from h.p. steam traps, l.p. steam traps and turbine condensers is collected and also pumped to the boiler feed tank. Water from the producer jackets is also supplied to the feed tank of the blue water gas plant. Any surplus in the boiler feed tank can be returned to the cooling towers. Cooling water for the effluent plant is also taken from the cooling tower pond and returned.

A line diagram of the boiler plant was given showing the main vessels and steam lines.

Waste gases from the setting pass through the superheater or superheater by-pass and into a common waste gas flue. The product inlet boxes of the seven waste heat boilers are connected to this common flue. The waste gases pass through the boilers and into economisers heating the incoming water, and then pass to atmosphere via the appropriate stacks.

The nominal rating of each boiler is 10,000 lb. per hour of saturated steam at 265 lb. per sq. in. gauge, and as all the h.p. steam generated is used for power generation, superheating is necessary.

Each superheater is capable of heating 20,000 lb. per hour of high pressure steam to a temperature of 710°F. The steam temperature is automatically controlled by the use of Kent controllers. This controlling action tends to vary slightly the pull on the settings and in the waste gas common flue. In order to obviate this, controllers have been fitted on the motor driven waste gas fans at economiser outlet and these have had the effect of keeping ' pull ' conditions steady.

The size of the waste gas mains and superheater by-passes, added to the fact that an augmentation flue is interconnected with each by-pass, results in loss of waste gas temperature unless strict supervision is kept over possible points of leakage.

Temperature of waste gas at	chimney base ...	830°C.
„ „ „ „ „	inlet superheater ...	780°C.
„ „ „ „ „	inlet boiler ...	710°C.
„ „ „ „ „	inlet economiser ...	285°C.
„ „ „ „ „	outlet economiser ...	205°C.
Temperature of water at	inlet economiser ...	94°C.
„ „ „ „	outlet economiser ...	140°C.
Temperature of steam at	outlet boiler	395°F.
„ „ „ „	outlet superheater ...	720°F.
CO_2 content of waste gas at	main waste gas flue ...	18.3
„ „ „ „ „	augmentation flue ...	16.5
„ „ „ „ „	inlet boiler	15.5

With present loading on producers, the fuel consumption, including augmentation, is of the order of 12-13% of the coal carbonised. This results in a waste heat steam production of approximately 30,000 lb. per hour to the turbines, which is equivalent to 4.0-4.2 lb. of steam per lb. of fuel at a pressure of 265 lb. per sq. in. On the basis of from and at 212°F., this figure is 4.4 lb. of steam per lb. of fuel. One of the advantages of having a common waste gas flue is that when a boiler comes off for its 14-monthly inspection, it is unnecessary to lose the heat available from any working setting which is normally taken up by that boiler. As a result of this, the steam generated per lb. of fuel remains fairly constant throughout the year, and generation conditions are governed more by pass-out demand than by high pressure steam available.

During the period of bench repairs or high pass-out demand, the high pressure steam can be augmented by burning producer gas in an augmentation flue and passing the waste gases forward into the common flue.

Dangerous Limit

A steam balance included in the appendix, showed that 30,000 lb. of steam per hour can be generated without augmentation and all used for power generation. Each turbine is capable of generating 1,200 kWs per hour with an input of 18,000 lb. per hour of h.p. steam, and a pass-out of 8,000 lb. per hour, the remaining steam passing through to the condenser at 28 in. Hg vacuum. With these conditions 1 kW is generated by 15 lb. of steam. Any increase in percentage pass out increases the steam required per kW generated. With a steam production of 30,000 lb. per hour and a pass out demand of 20,000 lb. per hour, 15,000 can go to each turbine and 10,000 pass out from each one. This condition will generate about 1,300 kWs which does not quite meet the works demand. There are occasions, *e.g.*, when no l.p. steam is available from the b.w.g. plant and the retort steam is increased, that the pass-out demand for process work approaches a dangerous limit. All scurfing is done at weekends because of reduced gas demand. Thus the h.p. steam produced can fall to 27,000 lb. per hour and the pass-out demand increase to 22-23,000 lb. A situation is then reached when any fluctuation in conditions creates operating difficulties. When these circumstances arise, it is much safer to generate an extra 4-5,000 lb. of steam per hour by augmentation. This can be done from the existing producers by a slight increase in load on each one and usually 6 lb. of steam per lb. of fuel can be generated by this method.

The turbines can each use 18,000 lb. per hour of high pressure steam and pass out at 17½ lb. pressure into the

works l.p. main, or condense against 28 in. Hg vacuum up to a limit of 10,000 lb. per hour.

Table III shows the hourly power used on all sections of the plant. The average hourly works load is set out showing the kWs used on all metered sections of the plant.

TABLE III

Showing the Hourly Power used in all sections of the Plant		
No. 1 L.T. transformer		454
No. 2 L.T. ,,		460
Compressor house and ancillaries		449
Works losses		33
Total works load		1,396
Generated by No. 1 turbine		511
,, ,, No. 2 ,,		628
,, ,, No. 3 ,,		129
Overall import of power		128
Total used on works		1,396
	kWs per hr.	*Total*
Effluent plants	37·2	
Workshops	4·0	41·2
Detarrers, tar and liquor transfer pumps and NH_3 washers	32.0	
Pump house and fans	48·0	
Tar loading pumps	3·0	
Exhausters	72·0	155·0
Waste Heat Boilers		
No. 1 Feed	30·5	
No. 2 Feed	38·9	69·4
Ret. house circ. liquor pumps	18·7	
Producer fans	146·3	165·0
Extractor driving gear	17·0	
Power House Auxiliaries	77·6	94·6
Pumps		
Fans		
Extraction pumps		
Coal and Coke Handling		
Tippler house	2·2	
Debreezing screens	3·2	
Scalping screens and belts	45·8	
Mimic panel and conveyors	45·8	97·0
Water Booster Pump House		
Administration block	4·6	
Coke plant lighting	14·1	
Water pumps	4·2	
Lighting and trans. losses	2·5	35.4
Purification		16·3
Works lighting		167·0
Compression		449·0

Results Using Fuel No. 3
Fuel used : 61% over $\frac{1}{4}$ in. 24·4% through $\frac{3}{16}$ in.
Average Flow Load : 1,600 cu. ft. air per minute B.S.T. 54°C.
Gas Offtake Temperature : 340°C.

Coke	*Ashes*	*Gas*
Carbon—dry basis 90.8	Carbon 5·0	CO_2 4·6
Ash —dry basis 8.0		CO 29·6
C.v. 13,100 B.t.u. per lb. dry coke.	Ash 94·3	O_2 0·4
		CH_4 0·4
		H_2 9·7
		N_2 55·2

Basis of calculation : 1 lb. of dry coke.

Carbon Balance

Carbon in coke .. .. $= 1 \times \cdot 908$ $= \cdot 908$ lb.

Carbon in ashes .. .. $= 1 \times \cdot 08 \times \frac{100 \times 5 \cdot 0}{94 \cdot 3 \times 100}$ $= \cdot 00425$ lb.

Estimated carbon in dust .. $= \cdot 010$ lb.

Carbon in gas .. .. $= \cdot 908 - \cdot 00425 - \cdot 010$ $= \cdot 8938$ lb.

Mols. of carbon in gas .. $= \cdot 8938 \times \frac{1}{12}$ $= \cdot 0745$ lb.

Mols. of carbon per mol. of gas $= \cdot 046 + \cdot 296 + \cdot 005$ $= \cdot 347$

Mols. of gas/lb. of dry coke .. $= \cdot 0745 \times \frac{1}{\cdot 347}$ $= \cdot 214$

∴ c.f. of gas/lb. dry coke .. $= \cdot 214 \times 385$ $= 82 \cdot 7$

Nitrogen Balance

Air to producers .. $= 1,600 \times 60$ $= 96,000$ cu. ft. per hour

Gas rate from producers $= 96,000 \times \frac{79}{55 \cdot 2} = 138,000$ cu. ft. per hour

∴ Coke gasified per hour $= \frac{138,000}{82 \cdot 7} = 1,665$ lb.

Efficiencies

C.v. of gas (gross) .. .. .. $= 130.2$ B.t.u. per c.f.

Cold gas efficiency .. $= \frac{82 \cdot 7 \times 130.2}{13,100} = 82 \cdot 2\%$

Hot gas efficiency .. .. $= \frac{82 \cdot 7 \times (130 \cdot 2 + 12 \cdot 3)}{13,100} = 90 \cdot 0\%$

Thermal yield per hour .. $= \frac{138,000 \times 130 \cdot 2}{100,000} = 180$ therms

Thermal yield per ton dry coke .. .. .. $= \frac{82 \cdot 7 \times 130 \cdot 2 \times 2,240}{100,000} = 241$ therms

Thermal yield per ton as received .. .. $= \frac{241 \times 84 \cdot 4}{100} = 204$ therms

Costs

Cost of fuel gasified .. $= \cdot 66 \times 135 + \cdot 34 \times 65$ shillings per ton $= 111 \cdot 2$

Cost per therm—dry basis .. $= \frac{111 \cdot 2 \times 12 \text{ pence}}{241} = 5 \cdot 53$ pence

Cost per therm—as received $= \frac{111 \cdot 2 \times 12 \text{ pence}}{204} = 6 \cdot 54$ pence

The sum total of the power useage shown in Table III, together with works losses, amounts to 1,396 kWs per hour. The maximum demand on works load at peak periods can reach 1,650 kWs, particularly if two tipplers are working together, the Goliath crane is lifting a tray of oxide, and the screening plant is working full out. In the winter period when the works lighting is required for approximately 14 hours per day, these peaks often occur.

As previously stated, the main demand for gas is during mid week and weekend scurfing is practised. The chance of operating at a constant daily load would be very acceptable, but at the moment is impossible. Coaling at night is often suggested but this would not bring any substantial saving in power and the cost of manpower would be increased. Producer and scurfing bunkers are fed at night whenever possible, and this does tend to spread the load a little. Compression is not too easy to spread because most people require the bulk of gas to meet peak demands. We may compress up to 700,000 cu.ft. per hour during the daytime and only 400,000 per hour at night.

When the works generation is almost equal to the works average demand, it is a pity to incur maximum demand charges when the generation of a few more kWs would save the outlay. Some people may argue that it is better to create an initial maximum demand at the beginning of the restricted period, *i.e.*, November 1 until February 28 and then keep the demand below the maximum for the remainder of the period. This is not quite so easy, the difficulty being how much demand to create. Failure of turbines, steam supply, etc., can create an even higher maximum demand figure, and any savings made during the previous months are lost.

Outside the restricted period, *i.e.*, from March 1 to October 31, kWs imported are not so expensive, and the important thing then becomes pass-out steam available. There are several conditions when the ratio of pass-out steam to h.p. steam approaches unity, *e.g.*:

(1) Medium throughputs, steaming down to the d.c.v. with benzole extraction and no blue water gas

admission: Then the volume of retort steam is high and no make up is available from the blue water gas plant.

(2) During the summer months when a bench is down for repair. The pass-out steam demand will remain as before except for a reduction of about 2,000 lb. per hour of retort steam, but the h.p. steam available will be considerably reduced. 22,000 lb. per hour is about the maximum that can be expected, and with a pass-out demand of 18,000 lb. per hour, operating difficulties are reached.

In the cases quoted above, augmentation would only be employed to influence the ratio of h.p. to l.p. steam, *i.e.*, enough steam would be generated to restore good working conditions only and the kWs so generated, although useful, would be secondary.

The turbines have been modified in design to give an increased pass-out, but any further modifications cannot be carried out. To replace the existing machines is expensive and and not to be considered. One point worthy of note is that augmentation steam is free from capital costs and is produced for very little other than the cost of fuel.

Taking the average generation all the year round (except when plant is off for repair) at 1,200-1,300 kW without augmentation, the maximum demand is of the order of 45 kW. The problem then arises whether to augment all the year round and export electricity to C.E.A. for a return of revenue, or whether to augment for the 18 weeks of the peak period and avoid maximum demand charges, alternatively not to augment at all and create a maximum demand each year.

Alternative Method

An alternative method of reducing the works demand would be to run a separate supply from the C.E.A. to the compressor house entirely divorced from the works supply. This would have obvious disadvantages, *e.g.*, during periods of light compression load when sufficient works power was available, the price we could obtain for exporting it would not pay the standing charges of the compressor layout. Any power failure on C.E.A. grids would mean that we should still be making gas into the holder but be unable to get rid of it. Similarly, with a works power failure, the reverse would apply.

There is no such thing as an efficient steam reducing valve. All one succeeds in doing when passing steam through such a valve is to give to that steam some degree of superheat. No useful work is obtained and the useful energy lost reduces all round efficiency. A pass-out steam turbine uses this energy in a useful manner and gives a return to the process, being about 70% efficient.

It follows, then, that all h.p. steam should be used in this manner. It is stated earlier in the paper that superheating is necessary when generating from steam turbines. May I say that superheating of high pressure steam, when transmission has to take place, is always necessary. The length of pipe run at Denton is comparatively small compared with some undertakings, but even we can lose up to 40° of superheat under given conditions. With a turbine running at 9,500 r.p.m. shaft speed, no wetness fraction can be tolerated except at the last set of blades on the l.p. side. These are designed to handle steam with a dryness fraction of not less than .87.

Operating conditions have varied from month to month and it is impossible to be dogmatic about the correct approach to this complex problem. Longfellow said 'It is quicker to do a thing right than to explain why you have done a thing wrong.'

References

[1] J. Hartill—*Producer Gas in The Gas Industry.*
[2] *Technical Data On Fuel.*

DISCUSSION

Mr. J. K. Lord, President, opened the discussion by saying that this was a very interesting paper and one which presented a great many questions.

Mr. Toby said that reference was made to the turbines being modified to increase the pass-out steam. The author had, however, pointed out that there was in fact no modification but just a change of design figures from the maker, allowing a pass-out pressure of 17½ lb. He would like to know the reason why 17½ lb. was required against 15 lb., when it seemed that efficiency would be lost in the turbines and high quantities of high pressure steam would have to be generated.

Mr. Dobson replied that they certainly did lose efficiency by passing out at a high pressure, but found that this was necessary. The main user of low pressure steam, apart from the retort house, was the effluent plant and it was a long run of pipe from the turbines to that plant, consequently if they passed out at 15 lb. they had only 12 lb. at the plant. By passing out at 17½ lb. they could obtain the required pressure for process work.

Mr. Townsend said there were three points he would like to ask Mr. Dobson:

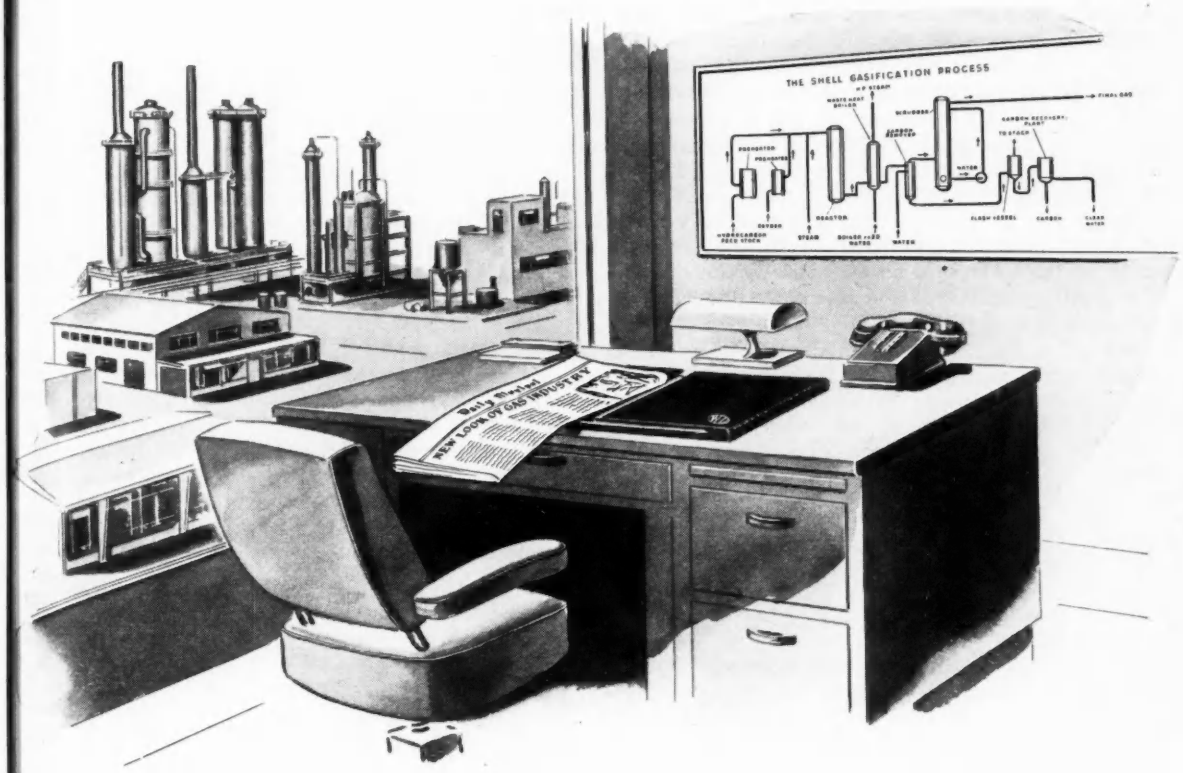
(1) Whether he had, in fact, run into difficulties with fuel which had a particularly high ash content or low ash fusion temperature. It was interesting to note that they could run at fairly high extraction rates only because they had the facilities for crushing the clinker in the generator and if the ash content were to rise above the average figure given in the paper—*i.e.*, 8%—it might possibly give rise to difficulty. Had this ever occurred?

(2) The paper said that the costs of the plant did, in fact, equal the labour charges of the plant. This gave rise to a bit of thought. It was really an illustration of the way things were going in these days when they were prepared to spend a lot of money to reduce labour costs.

(3) As this works was practically generating its own power, difficulties might be encountered due to Electricity Board failure. Could the author give the meeting some indication of what happened in the event of a power failure on the grid and what steps might be taken to avoid a complete shut down?

It was stated that augmentation steam was free from capital charges; this he could not agree with. Capital charges were bound to be incurred, particularly if an extra boiler was put in for augmentation steam. He would be interested to know the method by which augmentation on the works was controlled in order to keep pace with works' steam requirements. It was not automatically controlled and did the author consider it could, in fact, be done automatically.

Mr. Dobson replied that most of the coals which they had on the works had a slow ash content and 8 to



A new look is coming to the Gas Industry

Town gas still flows from the holders but the Works' skyline is changing and beginning to show the influence of Oil and High Pressure Processing. Woodall-Duckham's new High Pressure Processes Division has been formed to meet these changes and complete plants can be provided for the production of gases suitable for Town supply, etc. using modern high pressure techniques.

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10% was the highest coke ash figure they had encountered. It was found that with high breeze content, giving a slightly increased ash content, difficulty had been experienced in maintaining ash dips at a reasonable level.

With the b.s.t. reduced in an attempt to form clinker, the ashes had climbed to 60 in. at times. The ash formed from wet breeze tended to form a pad which rode round on the grate plates and was not easily extracted. When this happened the ashes tended to climb, the producer burned its own gas out to the fire zone extending to the top of the bed and conditions would become very bad.

He agreed on the point about capital and labour charges being identical and said Mr. Hubbard, in his paper in 1952, had stated that part of a man's remuneration could be counted in the congenial surroundings in which he worked.

Regarding augmentation, capital charges would only be incurred if it was necessary to put in an extra boiler in order to handle the increase steam make. If, however, one could manage on the existing boilers this problem would not arise—after all, the most augmentation steam they were looking for was between 5,000 and 6,000 lb. per hour. He did not think it would be possible to control the augmentation automatically; it was not easy to control manually. It was essential to avoid short flame conditions and overheating in the vertical section of the flue and just as essential to avoid the incomplete combustion in the vertical flue, with a tendency to use the superheater inlet as a combustion chamber.

Limit of Alterations

The day-to-day demand for steam was determined and the technical staff adjusted the augmentation control dampers to give the required conditions. Temperatures and draughts were recorded and any slight alterations to the setting were made by the shift foremen—if the necessity arose. The limit of their alterations were to maintain temperature and pull conditions steady and not to vary the quantity of steam generated.

Regarding electricity failure; assuming they were generating 1,100 kWs and the works' demand was 1,400 kWs they were, of necessity importing 300 kWs from C.E.A. Should C.E.A. fail for any reasons at all, they experienced a voltage drop and it was then necessary to shed works' load to restore the voltage and the frequency. If, however, the turbines went off and the C.E.A. failed they were not in a position to run at all. They were not generating steam and had no water cooling pumps available.

They had had an instance whereby an LT transformer tripped the ancillaries to the turbines and the electrician who was available at the time and the turbine operator were able to get things back on again before vacuum had been completely lost. They were not always as fortunate as this and on one occasion they were shut down for an hour and a half until power was available from C.E.A. to enable them to start the works again. He suggested that Mr. Hurst might like to say a few words about the business of protection.

Mr. Hurst said that the time Mr. Dobson had in mind was when C.E.A. failed and the works' generators attempted to feed Denton and consequently tripped out. The overloads had been set in such a way that the generator was set lower than the transformer, giving a measure of protection to both. In those circumstances, if the transformers gave out the generator should have kept running.

Mr. Partington remarked that the ancillary pumps were electric driven and if the electricity failed the turbines were incapable of working. He asked if it would be possible to replace these by steam ancillary pumps.

Obviate Changes

The producers on Denton works differed from the conventional type of step grate producers. He asked what change there was in the amount of repairs necessary on the setting because of this and what would be the effect of cooling the gas completely when it could be supplied at constant pressure and constant quality to the settings. This would obviate changes in temperature and in the heats, which would be caused by a change in quality of the gas from the producers.

The author replied that, in the event of a power failure, there was no steam available for running steam ancillaries. They had found by experience that it was better to conserve the reserve of steam in the boiler for starting up when power was available. Once the steam was used the pressure could drop from 265 lb. to 190 lb. in a matter of minutes. They had on order a diesel generator to cover power house ancillaries in the event of a power failure.

Regarding repairs to the settings, if it was possible to remove all the dust and dirt from mechanical producer gas without cooling the gas the life of the setting might possibly be lengthened slightly; certainly the life of the nostrils and damper tiles would be lengthened and the heats not require so much attention.

Regarding constant pressure and constant quality, they did try to achieve those conditions with their present arrangements, and with good technical supervision a high degree of efficiency was achieved.

Mr. Partington asked if it would cost more to cool and clean the gas.

Mr. Dobson replied that it would certainly cost more. First of all, extra capital charges would be incurred, increased maintenance costs would result and loss of at least 10% in efficiency on the setting would come from reducing the temperature to 60°F. The disposal of the washing medium and the attendant effluent problem would have to be solved, and they felt that, with the right type of fuel and correct supervision, the increased costs were unnecessary.

Mr. Nicholas said that on the question of augmentation for steam raising and making electricity by means of it, he very much doubted if it would ever be possible to do that and sell electricity to the C.E.A. at the prices they were prepared to pay for it. There were a lot of ramifications, and the whole question was very complicated, but as far as Denton works was concerned it would appear that steam could not be produced by augmentation for much less than 5s. per thousand. He did not think, apart from the question of keeping MD charges down, it would be a paying

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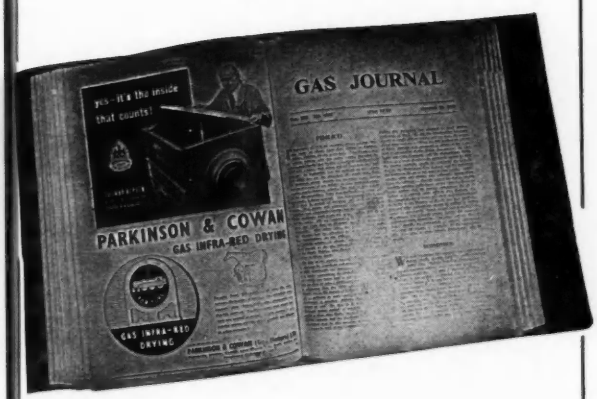

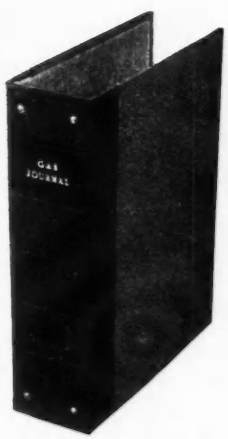

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proposition. Apart from that, the whole paper was an indictment against the use of pass-out turbines.

He felt very strongly on the subject of pass-out turbines because the whole business depended on the initial balance of steam and power, which was worked out for a particular works, being maintained during the entire life of that plant. This, of course, was quite impossible and so one got into difficulties and the way out was to augment—there might be other ways out.

He thought it would be better if, instead of a pass-out turbine, there was a back pressure turbine to generate electricity to the limit of the process steam requirements. It would also be possible to have a fully condensing turbine to cut off the peaks of imported electricity.

This scheme would mean that the imported electricity could be on a reasonably steady basis and would probably be cheaper than the pass-out method of generation; would do away with the need for augmentation and would probably result in an overall cheaper cost of electricity.

The author had mentioned that KVAR had to be generated; this appeared eventually as heat. It might be that generating KVAR, rather than buying from the Electricity Board, was not as paying a proposition as one might think.

On the question of C.E.A. going off, there were two problems; the system might fail for any sort of reason. Somebody turned a switch somewhere and the generators tried to feed a large area and they were obviously not big enough to do so. It was then necessary to make some provision to protect against that. This was very difficult to achieve; the C.E.A. required protection and works' generators required protection.

Another method of protection was a steam pressure gauge with contacts to make on a falling pressure, a tuned low frequency relay with contacts to make on low frequency, to reverse power relay with contacts to make on export power, the three sets of contacts in series to trip the import/export circuit breaker.

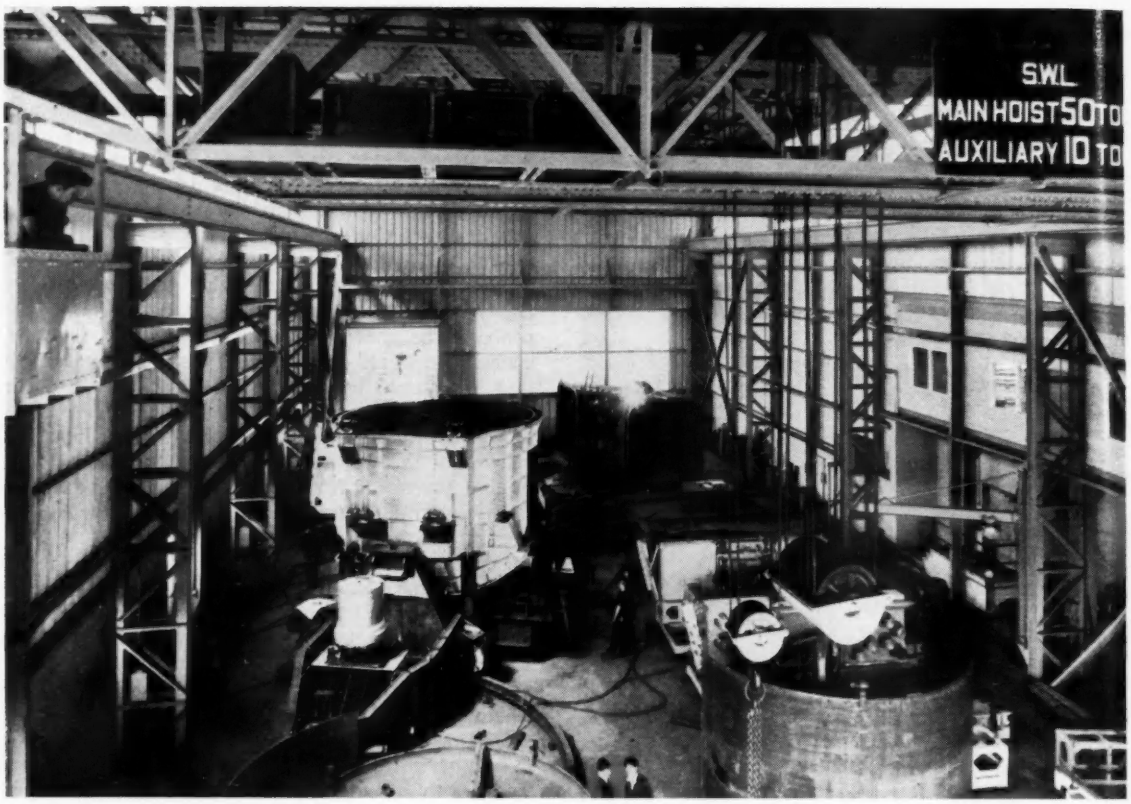
The author thanked Mr. Nicholas for his comments and noted with interest the remarks about a fully condensing turbine. He agreed whole-heartedly with his feelings about the initial steam and power balance being the ruling factor in the life of the works. It was obvious, although Mr. Nicholas had not said so in as many words, that £10,000 a year to augment presented rather a heavy figure, but he wished to point out one thing: over 97% of all the gas made at Denton in the last financial year was compressed out of the district and they were, therefore, at the mercy of outside gas demand.

If they were in a position to be base-loaded at 5½ tons per retort per day throughout the winter, that is, with somebody taking away the gas which they made, they would be in a position to generate 2,000 kWs per hour from waste heat steam only and would not need to augment. Set against this was the fact that they had no solid fire boilers with their attendant charges, and £10,000 a year was only £200 a week, this being the cost of 40 tons of fuel per week which it was necessary to burn by anyone with solid fuel boilers on stand-by.

He appreciated that KVAR was not obtained for nothing but was assured that, ignoring turbine losses, one got the same kWs per pound of steam.

Mr. Townsend proposed the vote of thanks.

Extension to Welsh Heavy Engineering Works



Interior of new fabricating shop showing on the left the 40-ton electric furnace under construction for Canada and in the right background the flame deflector for the Spadedam rocket site. The good working conditions are most noticeable.

NEW SHOP MAKES COMPANY MORE COMPETITIVE IN HOME AND OVERSEAS MARKETS

THE opening of the new fabricating shop by Sheppard & Sons, Ltd., of Bridgend, Glamorgan, gives South Wales a great chance of competing with the rest of Great Britain as well as the Continent in the production of heavy engineering work.

The works, which is well placed at the side of the Western Region main line running between Paddington and West Wales and connecting with the Midlands, has easy access for rail and road transport of its products inland as well as to the docks at Cardiff for export to the Continent or across the Atlantic.

The new shop is a modern well designed building, 170 ft. by 70 ft., with 30 ft. clearance for a 50-ton travelling crane. It is a steel frame structure covered in double asbestos cladding, well lit and allowing good working conditions. The north end of the building is a temporary structure and will allow a further extension as the complete modernisation of the works proceeds.

On a comparatively small site of about 3 acres, the works includes a foundry and pattern shop, fabricating shops, a machine shop, and an assembly bay. The present extension is built on the site of an old engine shed which at one time belonged to British Railways, but which by skilful planning and good design by the Company's Architect, has been transformed into a modern workshop in little less than a year.

The business of Sheppard & Sons, Ltd., dates from 1862, when it was founded for the development and manufacture of a process for the cleaning and treatment of coal and minerals. It is, therefore, traditionally connected with the supply of mechanical equipment to the coal industry in South Wales. As heavy industry grew in this area, so did the importance of the Company and it was able to expand its activities to cover all types of heavy engineering work.

The opening of the new workshop will enable the Company to take on larger work so that its claim to be able to compete on favourable terms in the production of any 'one off' job should be more than justified.

Work being turned out for the carbonising industries includes coke oven doors and fabricated steel work, an example of which is the set of purifier covers for a larger purifier plant at Aberavon in the Wales Gas Board. In the future, however, with the ever-changing scene on the modern gasworks there is likely to be a greater demand for fabricated steel work by the gas industry. The tendency towards the production of town gas by complete gasification processes either at low pressures or at very high pressure will demand the use of high grade welded steel vessels. The possibility of an extension of the gas grid systems culminating in the laying of a national grid will need the fabrication of 'specials' for the connecting-up to existing networks.

Specialised work, such as the construction of a 40-ton electric furnace for a Canadian firm and a flame deflector for the Ministry of Supply's rocket research establishment, is being successfully carried out.

Full Range of Portable Oxygen Producers

WILL OPERATE ON OWN DIESEL OR MAINS POWER

TO meet oxygen requirements of engineering works, research establishments and the services requiring an easily transportable oxygen producing plant, British Oxygen Gases Ltd., have now developed a standard range of fully transportable plants which can be easily operated for short or lengthy periods. They can be mounted in a vehicle or on a trailer or on skids for ease of movement.

Self-contained with their own diesel engines, they can also be supplied to operate from local electric power supplies. They can be operated intermittently or continuously.

The air compressor is multi stage, driven by Vee belting from the diesel engine. Air to the plant is drawn in through a dust filter, and twin filters enable the equipment to operate in dusty atmospheres. Cooling of the air between the compression stages is performed by means of tubular intercoolers.

The compressed air is passed through two soda-lime purifiers for the removal of carbon dioxide. It is necessary to accomplish this before the air enters the separation unit, otherwise solidification of the carbon dioxide would occur at the low temperatures which prevail.

In some instances, soda lime purification may be replaced by filtering of solid carbon dioxide, to allow operation without chemicals. The air then passes into the vaporisation cooler in which cooling is effected by the saturation of waste nitrogen gas with water. Condensed moisture and oil are removed from the compressed air by passing it through a separator.

Drying out of the compressed air is completed by means of activated alumina, which reduces to a minimum its free dewpoint. Two identical drier units are provided, the alumina charges alternately drying the air and being reactivated by hot waste nitrogen.

TRADE NEWS

The dried air is cooled in two countercurrent heat exchangers by means of the separation products of the process, travelling through the heat exchangers and thereby appreciably reducing the air temperature.

The air is then expanded through a valve, thus causing its partial liquefaction. Complete liquefaction occurs and is completed in the tubes of a reboiler in the bottom of the column. The liquid air then passes to the top of the main rectification column, where fractionation occurs and liquid oxygen collects in the sump of the reboiler.

The liquid oxygen is passed through a filter and then further cooled in an under-cooler. The oxygen can then be drawn off as liquid by means of a valve. If compressed oxygen is desired, the liquid is compressed in a liquid oxygen pump and is subsequently vaporised and warmed to ambient temperature in a heat exchanger. Cylinders can then be filled at any pressure up to 3,750 p.s.i.

Additional cold, for additional cold production may be provided by expanding the waste nitrogen stream in a turbine, placed in the gas stream between the two major heat exchangers.

A figure of 99.5% purity is normally possible with all transportable oxygen plants.

The only additional equipment required for the production of pure nitrogen gas from the plant is a small rectification column with superimposed condenser.

A nitrogen compressor driven by a small diesel engine can be provided to compress the pure nitrogen gas up to pressures of 2,200 p.s.i. for cylinder filling. The compressed dry gas is fed through an oil separator to the cylinder filling manifold.—*British Oxygen Gases Ltd., Spencer House, St. James's Place, S.W.1.*

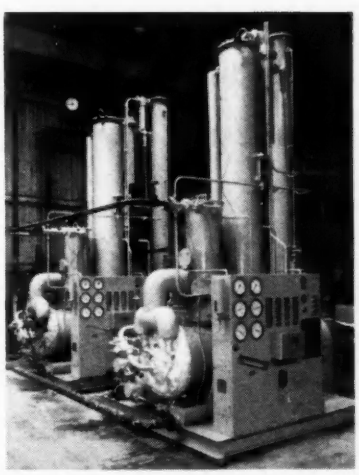
Holmes-Kemp Generators Produce Nitrogen From Any Fuel Gas

THE Holmes-Kemp nitrogen generator is capable of producing nitrogen by the combustion of any of the commercial fuel gases with air. Operation can be almost entirely automatic and the gas produced has a degree of purity which compares favourably with that of nitrogen made by any other full scale production unit.

Controlled combustion is achieved by the use of a carburettor which is adjustable over a wide range to give varying fuel to air ratios and which is automatically responsive to demand.

The products of combustion are cooled and carbon dioxide removal is then carried out by passing the gas through an adsorber tower containing monoethanolamine.

A nitrogen compressor is usually provided to enable the gas to be stored at pressure. Where necessary a Holmes-Kemp dryer can be included to ensure freedom from moisture. Plants of the type illustrated are available in capacities up to 20,000 c.f.h. nitrogen.—*W. C. Holmes and Co., Ltd., Turnbridge, Huddersfield.*



Seen recently at the Company's Turnbridge works, are the first two standard Holmes-Kemp nitrogen generators to be manufactured in the United Kingdom. Each of these generators has a capacity of 2,000 cu.ft. per hour.

PYRENE CO. LTD. LAUNCH THREE NEW PRODUCTS

THREE new products come from the Pyrene Co., Ltd. One of these, the latest addition to the Parkerising family of rustproofing processes, is the Parker 'F' process which has been developed to meet the demand for a process which will deal with small amounts of surface rust and at the same time produce an iron phosphate coating conforming to the requirements of Defence Specification DEF-29 (Class 1).

The Company's present range of Pyroclean cleaners has hitherto not included any material for heavy duty immersion cleaning. This gap has now been filled by the introduction of Pyroclean No. 9 which may also be applied by spraying. Although principally designed for use before the Bonderising or Parkerising of ferrous metals, Pyroclean No. 9 is proving extremely useful for various heavy duty immersion cleaning operations.

Preperite No. 3 is the Company's latest material for the removal of rust from iron and steel and corrosion products from non-ferrous metals. It offers economy in operation, low chemical consumption, is suitable for spray, immersion, or brush application, provides rapid action against rust, and minimum attack on basis metal.—*The Pyrene Co. Ltd., Metal Finishing Division, Great West Road, Brentford, Middlesex.*

Steel Plate in Rubber Boots Gives Protection Against Sharp Objects

Man Jumps 5ft. Onto Bed of Nails Unharmed

A NEW type of rubber industrial safety footwear, specially designed to prevent injuries caused by nails, glass, and similar sharp objects penetrating the sole of the boot, is now being marketed under the trade-name Armasol by the footwear division of BTR Industries Ltd.

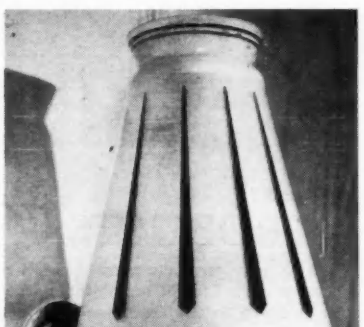
The most important feature of BTR Armasol footwear is a tempered-steel spring plate anchored firmly between the insole and outsole of the boot by a new bonding process. This steel inner-sole is immensely tough and flexible and, together with a steel-toe cap, gives a very high degree of protection against what have hitherto been, according to official industrial accident statistics, two of the most vulnerable and accident prone parts of the foot.

BTR Armasol footwear is as flexible as normal rubber protective footwear and is made in both knee-length and ankle-length styles. Both styles conform to B.S. Specifications 953 and 1934. —*BTR Industries Ltd., Herga House, Vincent Square, London, S.W.1.*

Falks Emergency Lighting Bracket

FALKS are now able to supply a contemporary pattern emergency lighting bracket unit specially designed for use in schools, cinemas, and any other public building where it is necessary for there to be an emergency lighting supply —see picture.

The number 76306 bracket comprises a rust proof nickel bracket, asylum type cock, and by-pass control with a specially designed Veritas upright burner equipped with a Veritas mantle. The contemporary pattern of the shade is on an obscured ground with red stripes and two red bands at the neck. As the unit is fitted with an asylum type cock no purchase tax is chargeable.—*Falk, Stadelmann and Co., Ltd., 91, Farringdon Road, London, E.C.1.*



DUCTER LOW RESISTANCE TESTING SET

THE Evershed and Vignoles Ltd., Ducter low resistance testing set can now be supplied ex-stock. The Ducter, which has proved itself an invaluable instrument in industry where critical values of resistance must be known, is a direct reading instrument measuring low resistances of a few ohms down to 1 microhm. It is a robust instrument built to withstand industrial treatment and yet maintain the high sensitivity needed.

The ohmmeter consists of a direct reading cross-coil ohmmeter of the type fitted in Megger insulation testers. It is contained in a strong hardwood case, provided with carrying handle, range switch, cut-out and resetting switch, two terminals at one end for the battery and four at the other for the current and potential connections. The scale length is $4\frac{5}{16}$ in., each instrument being individually calibrated. — *Evershed and Vignoles, Ltd., Acton Lane, Chiswick, W.4.*

Fisher Governor Company Range

FISHER GOVERNOR COMPANY, Marshalltown, by the acquisition of Continental Equipment Company, are now able to include in their range of control valves the well-known Continental butterfly valves.

The Company's leaflet E-7900A describes the Continental standard and heavy pattern valves powered by conventional Fisher diaphragm motor operators. They are, however, also able to supply these styles of butterfly valves arranged for lever, handwheel and chain wheel operation.

Another addition to the Company's range is the Wizard II pressure controller, with new and improved features, described in Bulletin D-4150.

While retaining all of the basic simplicity, accuracy and dependability of the Wizard 4100U, the new controller also incorporates a volume relay for faster response to pressure changes; provision for reset, thus ensuring closer pressure control; and wider proportional band with linear output.

The original Wizard I is still available for those applications not requiring volume relay and reset features.—*Fisher Governor Co., Ltd., Airport Works, Maidstone Road, Rochester, Kent.*

Keith Blackman Issue Three New Manuals

THREE new publications have been issued by Keith Blackman recently. The first relates to Tornado Type AFX, v-rope driven axial fans. This is a 40-page, quarto size catalogue dealing with both seven and eight bladed axial fans, all impellers being fitted with cast silicon-aluminium, and aerofoil section blades.

The second concerns Tornado Type APA propeller fans. This is a 24-page, quarto size publication dealing with the 6-in. to 48-in. diameter, 3-bladed propeller type fans, direct driven by totally enclosed motors manufactured by Keith Blackman specifically and only for fan application and constructed in accordance with BSS. 170:1939 and BSS. 2613:1955.

The third deals with Tornado Type EK, v-rope driven centrifugal fans. This new 48-page, quarto size publication covers the forward curved, multivane type of fan in sizes from Nos. 6 to 72.

Each of these catalogues is in the new Keith Blackman two colour, format, their contents providing full details of the relevant fan range, which includes specification, comprehensive capacity tables, dimension drawings, fan laws and other data applicable to the particular fan type, such as wireguards, shutters, switches, starters and regulators, bearings, access doors, position of motors and finishes.

Copies of the publications and photographs of the fan types are available on application to the undermentioned.—*Keith Blackman, Ltd., Mill Mead Road, London, N.17.*

Publications Received

English Electric

Five new illustrated and very comprehensive publications covering English Electric switchboard and panel instruments have just been issued.—*English Electric Co., Ltd., Instrument Division, Stafford.*

Jevco Brass Joints

A comprehensive and excellently produced catalogue has been published giving full details of 'Jevco' brass compression joints for copper and plastic tubes. The reference No. is 58/1/C.—*Jeavons Engineering Co., Tipton, Staffs.*